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A Statistical Study of Area Burned by Wildfire in Canada 1953-1980

James B. Harrington
Petawawa National Forestry Institute

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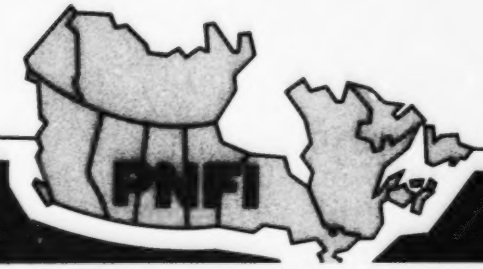

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PETAWAWA NATIONAL FORESTRY INSTITUTE

The Petawawa National Forestry Institute was formed on April 1, 1979, as the result of an amalgamation of the former Petawawa Forest Experiment Station, which had existed for more than 60 years, with the Ottawa-based Forest Management and Forest Fire Research institutes.

In common with the rest of the Canadian Forestry Service, the Petawawa National Forestry Institute has as its objective the promotion of better management and wiser use of Canada's forest resource to the economic and social benefit of all Canadians. Because it is a national institute, particular emphasis is placed on research into problems that transcend regional boundaries or that require special expertise and expensive equipment that cannot be duplicated in CFS regional establishments. Such research is often performed in close cooperation with staff of the regional centres or provincial forest services.

Research at the institute is in two main areas:

FIRE RESEARCH AND REMOTE SENSING. Every year in Canada large areas of productive forest are destroyed by fire. Research concentrates on studies of forest fire behaviour, the development of new methods of fire control, the evaluation of fire-fighting equipment and retardants, and the development of computerized fire management systems that are rapidly finding applications with fire-fighting agencies across the country. The environmental and economic impact of forest fires and the use of fire as a silvicultural tool for intensive forest management are also studied.

In remote sensing, investigations are made into the application of modern satellite and airborne remote sensing systems to forestry problems. In this respect, the ARIES digital image analysis system is proving invaluable.

INTENSIVE FOREST MANAGEMENT. As Canada moves into more intensive management of its forests to meet expected increases in demand for this important resource, the role of this program will become increasingly important. An extensive reforestation program will require a steady supply of high-quality seed of the desired species. Improved growing stock, obtained through tree breeding and forest genetics research, is highly desirable. Increased emphasis is being placed on using the entire above-ground portion of the tree (biomass), but the effect on the environment of this and other forms of intensive management has to be carefully monitored. Biotechnological methods of improving yield while maintaining site productivity are being investigated.

In support of its research programs, the institute has at its disposal a 98-km^2 area of forest in the northern part of the Petawawa military reserve. Records of experiments and sample plots have been maintained since the 1920s. The forest also serves as a field laboratory for students from local schools, and a visitor centre is operated during the summer months.

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Abstract

A statistical analysis of the area burned by wildfire in Canada from 1953 to 1980 has been carried out for the months of May through September in each of nine provincial areas. The following subjects are examined and discussed: the frequency of severe fire months; the annual trend, seasonal variation, and statistical distribution of burned area; the correlations in burned area between the provincial units and from month to month within each; the lagged autocorrelations of annual data for each unit; and the likelihood of multiple occurrences of severe fire years among units.

Monthly figures of the area burned in the provincial units conform closely to a log-normal distribution: the fires in 89 percent of the area burned occurred in the 17 percent of the months having an above-average burn, and those in fully 60 percent of the area burned occurred in the 5 percent of the months having a burn five or more times the average size. The data do not support a consistent continuation of the recent upward trend in Canada-wide area burned, first because there is no significant correlation in any provincial unit between area burned in one year and that burned in the next, and second because much of the recent increase is attributable to burns in the Yukon Territory and the Northwest Territories, where 37 percent of the Canada-wide burn occurs.

Résumé

On a effectué une analyse statistique de la superficie touchée par les feux de forêts dans neuf provinces, de 1953 à 1980, de mai à septembre. On fait l'examen et on discute de la fréquence des mois de feux graves; de la tendance annuelle; des fluctuations saisonnières; de la loi statistique que suit la superficie touchée; des corrélations entre les provinces quant à la superficie brûlée et entre la superficie brûlée par mois dans chaque province; des autocorrélations retardées entre les données annuelles de chaque province; et de la probabilité que des années de feux graves surviennent dans plusieurs provinces.

Les chiffres mensuels des superficies brûlées dans toutes les provinces suivent étroitement une loi log-normale; 89% de la superficie est brûlée au cours des mois (17%) pendant lesquels la fréquence des feux est supérieure à la moyenne, et au moins 60% de la superficie est brûlée au cours des mois (5%) pendant lesquels la superficie brûlée est de cinq fois la superficie moyenne ou plus. D'après les données, la récente tendance à la hausse de la superficie brûlée au Canada ne persisterait pas indéfiniment parce que, d'abord, il n'y a aucune corrélation significative entre la superficie brûlée en une année et celle de l'année suivante dans toutes les provinces et, ensuite, parce que la plus grande partie de l'augmentation récente est attribuable à des feux qui sont survenus dans les Territoires, où 37% des feux du Canada surviennent.

A STATISTICAL STUDY OF AREA BURNED BY WILDFIRE IN CANADA 1953–1980

Preface

The great increase in total area burned by forest fires in Canada since 1975 (with bad fire years in 1976, 1979, 1980) has spurred questions as to the cause and predictability of major fire years (Fig. 1; Appendix A).* Prolonged dry weather, in particular, appears to lead to an explosive growth in fire spread, which at times overwhelms the capacity of provincial fire protection agencies to maintain control. To gauge the effect of dry weather on the susceptibility of a forest to fire a study has been undertaken at the Petawawa National Forestry Institute (PNFI) in which components of the Fire Weather Index (FWI) (Van Wagner 1974), the Fire Severity Rating (Van Wagner 1970), and various meteorological variables are used in the estimation of the forested area burned in each provincial area and month during the five fire months (May–September) for the years 1953 through 1980. The study is limited to these years by the lack of complete weather data in computer-compatible form for earlier years; also, reasonably sufficient monthly provincial fire records are available for the period 1953–80 (Ramsey and Higgins 1981, and personal communication with them).

The purpose of this first report is to present a statistical analysis of the data regarding burned area only. Subsequent reports will deal with the relationship between burned area and the fire indices and weather variables.

James B. Harrington is a research scientist at the Petawawa National Forestry Institute.

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*Preliminary data indicate that the total burned area in Canada in 1981 was the highest on record.

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Method of analysis

The figures of burned area given in this report were obtained from records of the PNFI Forest Fire Technical Information Centre. They include all area burned as reported but take into account neither the intensity of the fire nor the value affected. "Area burned" refers to all land on which wildfires occur, including forest, cutover forest, grasslands, scrub, etc.

The original data from each province have been combined (or, in one case, separated) into geographic units of analysis to conform to 'provinces' of roughly comparable size. The provinces are British Columbia, the Yukon Territory and the Northwest Territories (to be called 'the Territories'), Alberta,

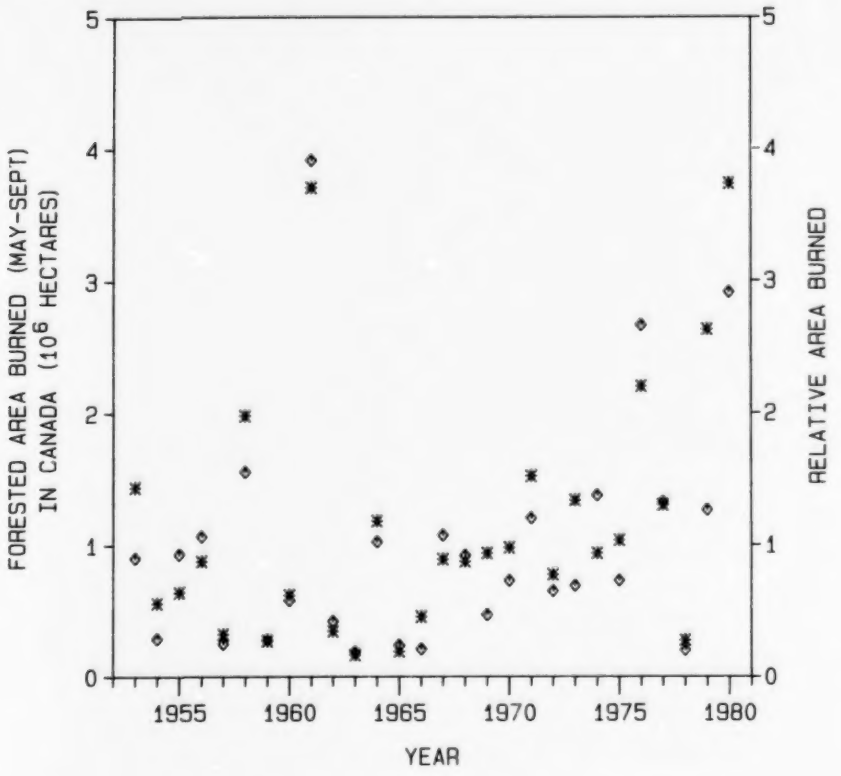

Figure 1. The area burned annually by wildfire in Canada: ✱ = total area burned; ◇ = relative area burned averaged over all provinces and months.

Saskatchewan, Manitoba, Western Ontario (west of Lake Nipigon), Eastern Ontario, Quebec, and the Atlantic Provinces (Newfoundland, New Brunswick, Nova Scotia, and Prince Edward Island). Two units are created out of Ontario because of a widely held belief in the existence of a climatic divide near Lake Superior. Only the main fire months–May to September, inclusive–are considered, which means excluding the small fraction of area burned in April and October.

The manner in which the data are reported—that is, temporally by total area burned monthly and spatially by whole province—masks the basic relationships between area burned and its main determining factors: weather, fuel type, cause of ignition, and characteristics of the fire control organization. For example, a breakdown of area burned into smaller regions would contribute to more meaningful correlations with weather variables because monthly meteorological averages can vary widely over a region as large as a Canadian province. This problem is expected to become apparent in later papers, when area burned in an entire province will be correlated with fire weather indices or meteorological variables measured at a few isolated stations.

Data are provided both in hectares and relative to provincial means. The relative data are obtained by dividing each monthly figure in a given province by the average monthly burn in that province over the 140 months (5 months by 28 years) of data. This tranformation equalizes the influence of geographic size and reduces the influence of occasional vast burns in one province. The use of relative data also eases the task of recognizing the severity of the season as compared to other seasons in a given province because

Table 1. Relative area burned and number of occurrences in above-average and extreme fire months

	Above-Average Fire Months				Extreme Fire Months			
	Relative Area*	%	No. of Months*	%	Relative Area*	%	No. of Months*	%
B.C.	116	83	25	18	76	54	6	4.3
Y./N.W.T.	124	89	33	24	52	44	8	5.7
Alta.	125	89	25	18	86	62	5	3.6
Sask.	126	90	25	18	79	57	8	5.7
Man.	121	86	24	17	84	60	8	5.7
W. Ont.	132	94	17	12	109	78	8	5.7
E. Ont.	126	90	21	15	91	65	6	4.3
Que.	124	89	30	21	75	54	8	5.7
Atl. Prov.	122	87	17	12	103	74	7	5.0
Average	124	89	24	17	84	60	7	5.0

*Out of a total of 140.

the average relative area burned monthly is unity. In 1979, for example (Fig. 1), the data in hectares indicate a severe fire year, whereas the relative data indicate that the area burned was only slightly above average. The difference was a consequence of an extreme fire year in the Territories, where the burned area accounted for 76 percent of the Canada-wide total.

Frequency of above-average and extreme fire months

The area burned and relative area burned in each province by fire month for the years 1953 to 1980 inclusive are listed in Appendix B. An outstanding feature of this data is the infrequency of above-average fire months and the large fraction of the total area that was burned during those months (Table 1). In British Columbia, for example, above-average fire months comprise only 18 percent of the 140-month total, but they account for 83 percent of the area burned. Moreover, if an extreme fire month is defined as one in which the area burned exceeds five times the average, then extreme fire months in B.C. represent only 4.3 percent of the total months but account for 54 percent of the total area burned. Considering the relative data for each provincial area separately, it can be seen that, on the average, 89 percent of the burned area is burned during above-average fire months, which represent only 17 percent of the total, and 60 percent is burned in the 7 extreme fire months, which represent only 5 percent of the total.

Seasonal distribution of area burned

The seasonal distribution of area burned in Canada is shown in Table 2. Not shown is the small but significant area burned in April.* There is a rapid increase in May, rising to a peak in June and followed by a slight decline in July, a major decline in August, and a virtual end to the fire season in September.

* The data for April were omitted because over the period of record they account for less than 1 percent of the annual area burned (D. Higgins, personal communication). The omission is regrettable in view of the fact that the area burned in April corresponds closely to that burned in September.

Table 2. Average monthly distribution of Canada-wide area burned

	Area Burned	%
	(ha)	
May	193 446	16.8
June	421 605	36.7
July	360 432	31.4
August	159 093	13.8
September	14 634	1.3

provinces occasionally experience an early fire season, but generally their most severe fires are in June. June and July are the peak months in Quebec and the Atlantic Provinces. This late start may be a consequence of the slow development of spring in the east and of the greater winter precipitation in these provinces. Another factor of importance, in hardwood stands, is the date of leaf-out. Once the leaves in hardwood vegetation have appeared, usually by early June, the increased shading of the ground and

Table 3. Seasonal distribution by province of average area burned

	May		June		July		August		September	
	Area	%	Area	%	Area	%	Area	%	Area	%
	(ha)		(ha)		(ha)		(ha)		(ha)	
B.C.	16 885	16.0	15 227	14.3	27 263	25.6	40 271*	37.8	6 657	6.3
Y./N.W.T.	6 639	1.5	156 310	36.9	189 894	44.8	68 719	16.2	2 358	0.6
Alta.	47 928	63.1	15 487	20.3	6 760	8.9	4 718	6.2	1 134	1.5
Sask.	37 530	22.8	78 321	47.7	38 978	23.7	9 156	5.6	336	0.2
Man.	41 157	33.3	36 186	29.2	33 649	27.2	9 801	7.9	2 957	2.4
W. Ont.	21 982	26.5	44 083	53.1	14 567	17.6	2 237	2.7	43	0.1
E. Ont.	8 418	30.0	12 571	44.8	5 462	19.5	1 542	5.5	52	0.2
Que.	9 743	11.2	40 257	46.2	26 981	30.9	10 066	11.5	196	0.2
Atl. Prov.	3 163	5.6	23 163	40.8	16 878	29.8	12 581	22.2	902	1.6

*Maximum alues for each province are underlined.

The monthly distribution varies markedly from province to province, as shown in Table 3. Alberta and Manitoba peak in May; Saskatchewan, Ontario, Quebec, and the Atlantic Provinces peak in June; the Territories unit peaks in July; and British Columbia peaks in August. A longer period of record could conceivably shift some of these peaks by a month, because the variance in the data is large.

The late fire season in British Columbia is likely a consequence of the normal wet winter season followed by a prolonged summer drought culminating in early August. The late season in the Yukon and the Northwest Territories is a result of the late melting of snow and ice. Alberta, with its winter chinooks, maintains less snow on the ground and consequently becomes dry early in the spring. The remaining central

increased water content of the vegetation serve to decrease the risk of rapid fire spread. However, the main burned area is in forested land dominated by conifers.

Annual trend in area burned

There has been concern recently about the increase in area burned during the decade including the late seventies and early eighties (Stocks et al. 1981; Harrington 1981). The increase in the annual Canada-wide burn figures shown in Figure 1 clearly justifies that concern. However, one must use care in assigning the word "trend" to this increase, because a trend implies continuation in a predictable pattern. In any sequence of random numbers there will be segments in which the numbers increase or decrease with

apparent consistency. So-called trends in random data do not imply any predictability whatsoever. Long-period trends in temperature or precipitation do occur in meteorological data, as, for example, the century of increasing temperatures ending in the 1940s and the trend toward cooler temperatures since. These trends have some physical cause such as, in the case of meteorological data, a complex and as yet poorly understood interaction between sun, earth, air, ice, and ocean. Because forest fires are in many ways related to the weather and to other changing factors, including improved fire fighting technology, it is possible that trends in statistics of area burned do occur. However, in the short period of accurate record available, many apparent trends may reflect nothing more than random occurrences. Care must be exercised in extrapolating apparent trends into the future. Our current knowledge provides no basis for extrapolating the trend appearing in Figure 1.

When the data from the individual provinces are examined, there is no consistent continent-wide pattern (Fig. 2 and Appendix C). British Columbia data show a peak in the late fifties and early sixties followed by an irregular decline. The data for the Territories show an increase toward the eighties. The Alberta data set has three peaks—in 1956, 1968, and 1980—but no consistent trend. Saskatchewan data are similar to those of Alberta. Manitoba data indicate the most severe fire years as being in the early sixties. The best support for an increasing fire trend is provided by data from Ontario west of Lake Nipigon, where devastating fires were experienced in the seventies. In Eastern Ontario, a rising trend was apparent by the mid-seventies but had declined toward the end of the decade. A similar pattern appears in data from Quebec and the Atlantic Provinces, relatively little area having been burned after 1976.

The increase in area burned during the past decade appears to be largely a June and July phenomenon (Fig. 3). No trend is evident in either May or August. It is possible that a Canada-wide trend could be the result of large burns in a single provincial area: the fires occurring in the Territories from May to September of 1953–80 accounted for 37% of the total area burned during that period (Table 4). However, after the overriding effect of this area on the Canada-wide average is removed by the use of relative data, there still appears to be an upward trend in area burned in the month of June (Table D, Appendix D).

Table 4. Distribution by province of area burned, May–September, 1953–1980

	Area	%
	(ha)	
B.C.	2 976 540	9.3
Y./N.W.T.	11 869 760	36.9
Alta.	2 128 700	6.6
Sask.	4 600 960	14.3
Man.	3 465 000	10.8
W. Ont.	2 321 480	7.2
E. Ont.	785 260	2.4
Que.	2 442 560	7.6
Atl. Prov.	1 587 180	4.9
Total	32 177 740	100.0

Distribution of area burned annually

Various distributions—including the binomial, the Poisson, the gamma, the Weibull, and the log-normal—were fitted to the data on area burned annually for each province.* Of these, the log-normal provided the best fit. The fit to a log-normal distribution could not be rejected, even at the 80-percent confidence level when using the nonparametric Kolmogoroff-Smirnoff test (Hoel 1962). Indeed, the maximum difference between the log-normal distribution function and the actual distribution for any provincial area had a value of 0.12, well below the value of 0.20 required, according to the test, for

*Duncan MacLeod, Computing and Applied Statistics Directorate, Environment Canada, personal communication.

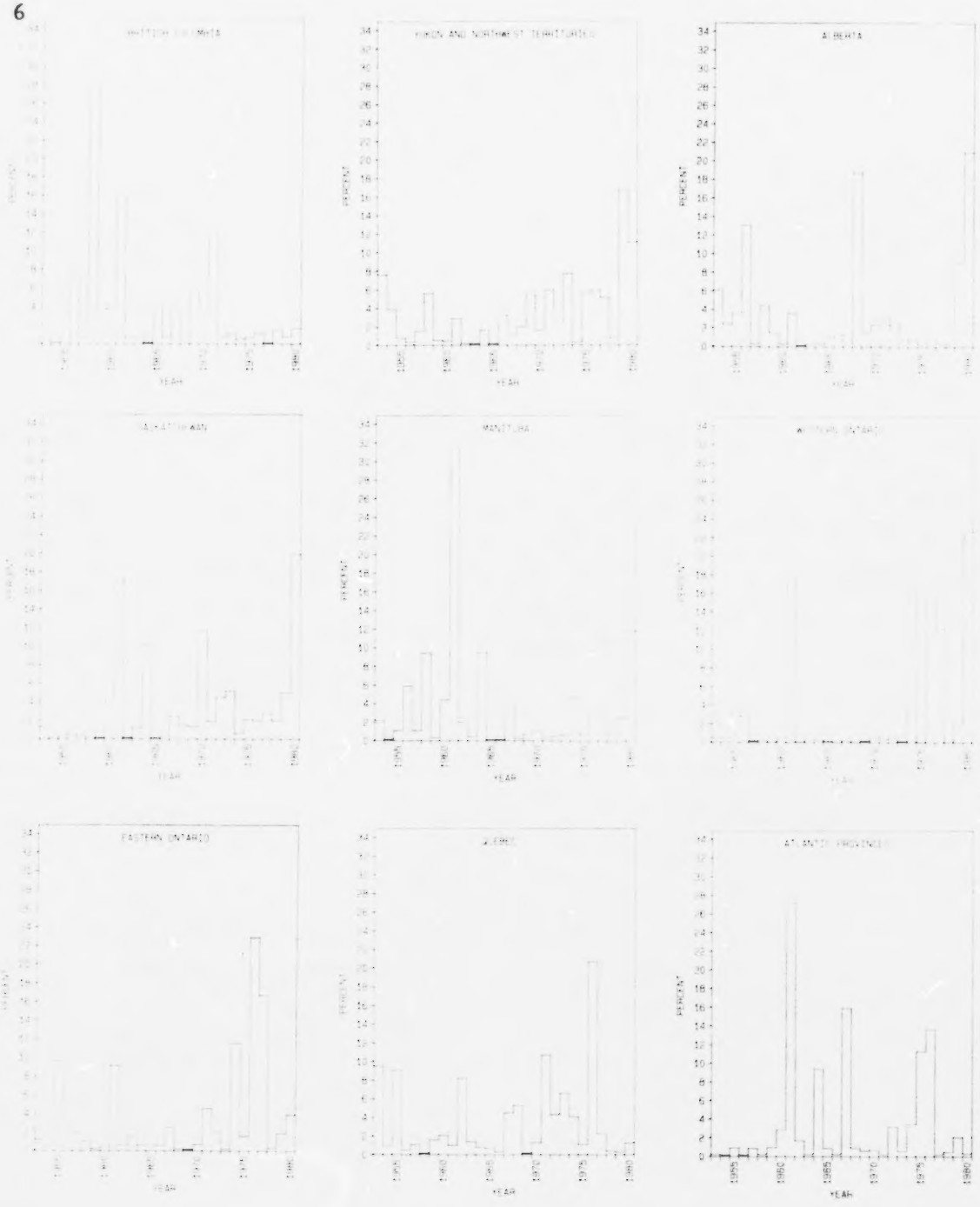

Figure 2. The provincial area burned annually by wildfire expressed as a percentage of the 1953–1980 total.

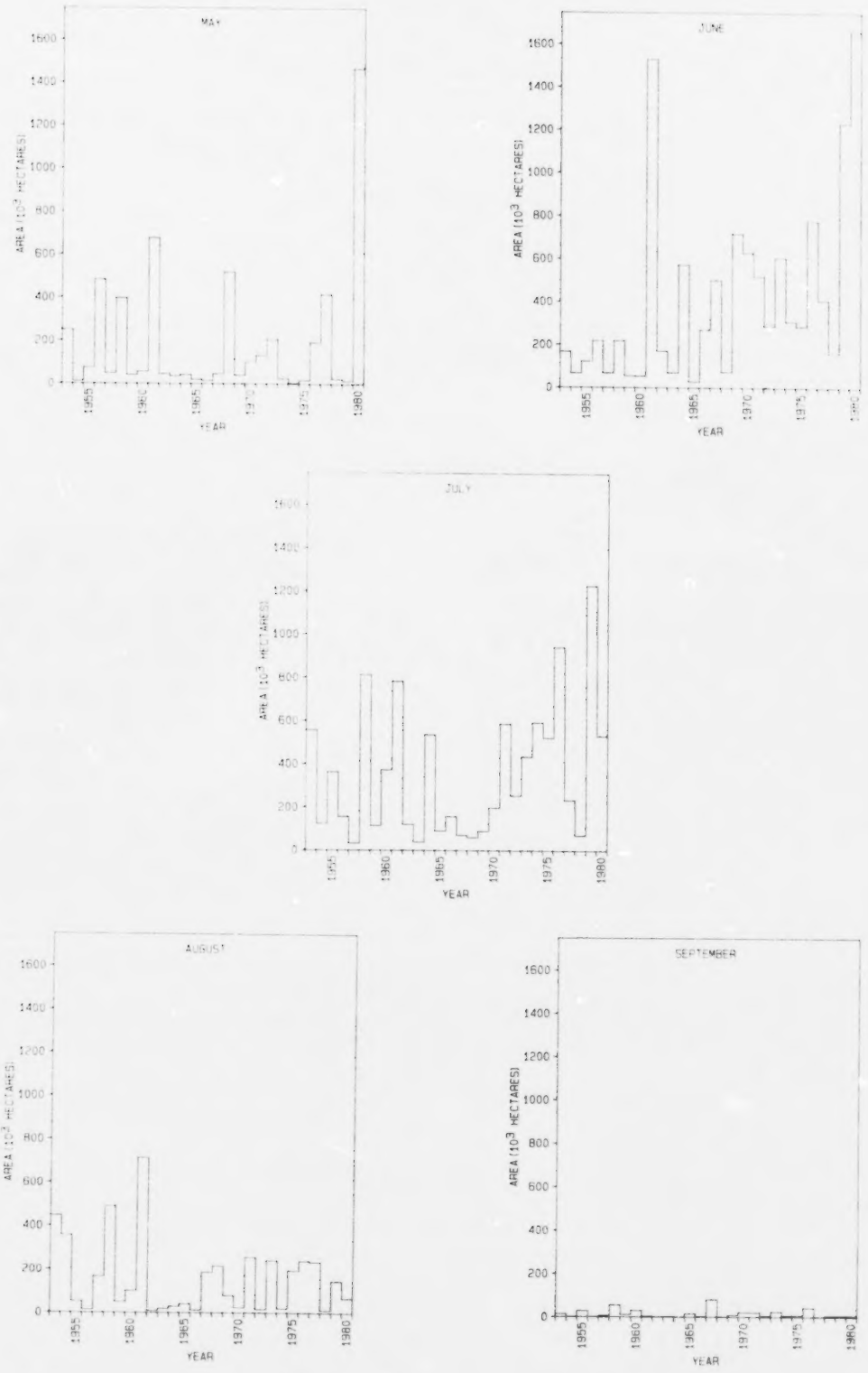

Figure 3. The area burned monthly by wildfire in Canada.

an 80-percent probability of rejection. Tabulation of theoretical frequencies from the normal curve compared to observed frequencies from all of the log-relative data from the nine provincial areas (Table 5 and Table C3) reveals a fit to the log-normal distribution that cannot be rejected even at well above the 99-percent confidence level (χ^2 = 0.77 with 8 degrees of freedom).

In distributions as skewed as the log-normal, the median may be a more meaningful statistic than the average for some uses. In this strongly skewed distribution, the median provincial area burned annually is about 35 percent of the average. The half of the observations above the median are strung out toward high values of area burned, only a little more than a quarter of the years (28%) exceeding the average.

Table 5. Expected and observed frequency of occurrence of the logarithms of area burned

Standard Deviations (S) from the Mean	Expected Occurrences	Observed Occurrences
$-2.0 \geq S$	5.7	6
$-1.5 \geq S > -2.0$	11.1	11
$-1.0 \geq S > -1.5$	23.2	24
$-0.5 \geq S > -1.0$	37.8	36
$0.0 \geq S > -0.5$	48.3	55
$0.5 \geq S > 0.0$	48.3	40
$1.0 \geq S > 0.5$	37.8	40
$1.5 \geq S > 1.0$	23.2	20
$2.0 \geq S > 1.5$	11.1	18
$S > 2.0$	5.7	2
Total	252.2	252

Variability of area burned monthly

The degree of variability of area burned monthly as measured by the standard deviation (Table 6) parallels the monthly distribution shown in Table 3. The greatest variability occurs in Alberta in May, when there was an average seven-fold deviation from the mean. Planning for fire control under conditions of such extreme variability must be exceedingly difficult. In two out of three years, the area burned in Alberta is below average; but in one year in seven, it virtually explodes, on two occasions reaching as high as 25 times the average. The standard deviation in all provinces averages about 3.5 in June and 2.5 in July. In August, the coastal provinces show the greatest variability and the central provinces the least. September is a month of low incidence of fire and small risk that an extensive area will be burned in any provincial area.

Persistence of fire

It is a well-known fact in meteorology that persistence of a particular weather element is slightly more likely than change. For example, the probability that a month will be drier than average increases slightly when the preceeding month has been droughty. The extent to which this effect carries over into fire is illustrated in Appendix E, Table E1, and Table 7. Although there appear to be several significant correlations in Table E1, these cannot be tested because the data are not drawn from a normally distributed population. However, as discussed above, the logarithm of the area burned does conform to a normal distribution and therefore can be tested. The correlation coefficient of the log-area burned is shown in Table 7. Under the Z test (Hoel 1962, p. 166), with 28 years of data, correlations exceeding 0.446, 0.372, and 0.316 can be accepted at the 99-percent, 97.5-percent, and 95-percent confidence levels, respectively. Although the level of confidence in the correlation coefficients given above is high, it should be noted that the amount of variance explained at these levels of correlation amounts to only 20, 14, and 10 percent, respectively.

Within each provincial area, the dominance of positive correlations in Table 7 indicates persistence in area burned from month to month. Persistence appears to have been particularly strong in British Columbia from June onward. In

Table 6. Standard deviation of the relative area burned

	May	June	July	Aug.	Sept.
B.C.	1.88	1.24	3.03	4.75	0.56
Y./N.W.T.	0.21	2.85	2.65	1.15	0.06
Alta.	7.04	2.37	0.61	0.95	0.18
Sask.	2.65	4.18	1.86	0.60	0.03
Man.	4.08	2.89	2.43	0.80	0.32
W. Ont.	3.87	5.54	2.91	0.53	0.01
E. Ont.	2.75	4.07	2.33	0.80	0.02
Que.	0.68	3.66	3.04	1.61	0.02
Atl. Prov.	0.33	5.54	3.22	3.71	0.28

Western Ontario an early fire season persisted into June and July but declined in August and appears to have collapsed by September. Of course, the reverse could also be stated–that a wet spring with little fire is likely to persist into July, with an increasing risk of fire toward September. The most significant correlations occur between area burned in the months of July and August, and August and September, in British Columbia, and June and July in the Yukon and the Northwest Territories, Manitoba, and Western Ontario.

Areal extent

The correlation between area burned and the logarithms of area burned in one provincial area and another is shown in Appendix E, Table E2, and in Table 8, respectively. The limits of significance are the same as those noted above. In May there is a high degree of correlation between areas burned in adjoining provinces. This reflects the presence of drought-producing high-pressure ridges that are roughly half a continent wide. There seems to be no correlation between fire in the Atlantic Provinces and fire in any province other than Quebec.

In June, high occurrence of fire in one province appears to be significantly correlated only with fire in the adjacent provinces, excepting British Columbia and the Territories, where no significant correlations occur. It is of interest, however, that area burned in British Columbia is negatively correlated with area burned east of Saskatchewan, suggesting again that the wavelength of drought-producing high-pressure ridges and rain-producing low-pressure troughs may generally be of the order of a continent in width. The same effect appears strongly in July but more weakly in August and September.

As the summer proceeds, the correlation in area burned between adjacent provincial areas declines, persisting only from Saskatchewan eastward in July and to a negligible extent anywhere in August and September.

The strongest correlations occur between areas burned in Western and Eastern Ontario. These areas had been separated because of a belief based on observations during the 1980 fire season that there was a climatic divide in the vicinity of Sault Ste. Marie. The two areas were separated at Nipigon rather than Sault Ste. Marie for convenience, but they show such a strong correlation that it is doubtful whether any other dividing line would have yielded evidence for a climatic divide in Ontario.

Year-to-year persistence

An autocorrelation program was run at lags of from one to six years on the data for each provincial area to see whether there was a greater-than-chance probability that one bad fire year would follow

Table 7. Correlation between the logarithms of the area burned in each month and in subsequent months

		June	July	Aug.	Sept.
B.C.	May	0.1949	0.3169	0.1612	0.1320
	June		0.3849	0.4740	0.4382
	July			0.7052	0.3797
	Aug.				0.5823
Y./N.W.T.	May	0.2057	0.1038	-0.0726	-0.0742
	June		0.6552	0.3860	0.0156
	July			0.5357	-0.1292
	Aug.				0.0927
Alta.	May	-0.1241	-0.0531	-0.0638	-0.1343
	June		0.1971	0.1753	0.0789
	July			0.3865	0.3535
	Aug.				0.1883
Sask.	May	0.2312	0.2177	0.4226	0.0245
	June		0.3416	0.2823	-0.2707
	July			0.2765	-0.2247
	Aug.				-0.1227
Man.	May	0.2978	0.1462	0.1231	0.0183
	June		0.5623	0.0722	-0.0764
	July			0.4479	-0.2330
	Aug.				0.1120
W. Ont.	May	0.4972	0.4700	0.1981	-0.4030
	June		0.6703	0.2567	-0.3785
	July			0.3341	-0.1489
	Aug.				-0.1290
E. Ont.	May	0.0802	0.2248	0.1969	0.3972
	June		0.3944	0.0427	0.0270
	July			0.3079	0.1765
	Aug.				0.1620
Que.	May	0.2089	-0.1107	0.0081	0.1333
	June		0.3912	0.0673	0.0685
	July			0.4713	0.2325
	Aug.				0.0248
Atl. Prov.	May	0.0938	0.1245	-0.1402	0.0144
	June		0.3129	0.4345	-0.1782
	July			0.3067	-0.0608
	Aug.				0.4465

Table 8. Correlation of the logarithms of area burned in each province, by month

	Y./N.W.T.	Alta.	Sask.	Man.	W. Ont.	E. Ont.	Que.	Atl. Prov.
May								
B.C.	0.4539	0.6341	0.3010	0.3150	0.1113	0.0333	-0.0161	-0.1051
Y./N.W.T.		0.2354	0.3015	0.5787	0.2117	-0.0478	-0.0188	-0.1704
Alta.			0.4949	0.3794	0.3431	0.2861	0.4263	-0.0094
Sask.				0.6063	0.5252	0.4721	0.3935	0.0440
Man.					0.3730	0.2895	0.2716	-0.1220
W. Ont.						0.7368	0.4003	0.1766
E. Ont.							0.4629	0.1487
Que.								0.4760
June								
B.C.	0.0178	0.1249	0.0587	-0.1056	-0.0790	-0.0030	-0.1524	0.2491
Y./N.W.T.		0.2212	0.2147	0.1309	0.0361	-0.0482	-0.2996	0.0289
Alta.			0.3258	0.2755	0.4390	0.3127	-0.2763	-0.1085
Sask.				0.4768	0.3027	0.2710	-0.0708	0.0607
Man.					0.5541	0.4679	-0.1577	0.2472
W. Ont.						0.8986	0.1548	0.2252
E. Ont.							0.3393	0.2724
Que.								0.3393
July								
B.C.	-0.2086	0.2902	0.0260	-0.3531	-0.5464	-0.4709	-0.2954	-0.1969
Y./N.W.T.		-0.1049	0.1359	0.0502	0.1461	0.0387	0.0882	0.2339
Alta.			0.1199	0.0511	0.1215	-0.1000	-0.3395	0.0094
Sask.				0.4756	0.0668	-0.1370	0.1809	0.2566
Man.					0.3728	0.0561	0.2111	0.2477
W. Ont.						0.8230	0.2995	0.3663
E. Ont.							0.3859	0.2850
Que.								0.4679
Aug.								
B.C.	-0.3056	0.5853	0.2713	0.1408	-0.0241	0.0427	-0.1735	0.1033
Y./N.W.T.		0.0312	-0.0180	-0.2146	0.0460	0.0655	0.0462	0.0043
Alta.			0.2551	0.1559	0.2710	0.2277	-0.0587	-0.1077
Sask.				0.4969	0.1539	0.1620	0.0194	0.0182
Man.					0.1919	0.1834	0.1920	0.0376
W. Ont.						0.5236	0.4683	0.3072
E. Ont.							0.2693	0.2607
Que.								0.2835
Sept.								
B.C.	0.0388	0.2462	0.0863	0.0224	0.1954	-0.0347	-0.1320	-0.1304
Y./N.W.T.		0.0301	0.2638	0.0366	0.1807	-0.0937	0.0088	0.2027
Alta.			-0.1125	-0.0566	0.1003	-0.0913	0.0645	0.2937
Sask.				0.1048	0.0705	-0.4162	-0.4104	-0.2212
Man.					0.4006	0.0537	-0.0964	0.2132
W. Ont.						-0.0827	0.1606	0.2035
E. Ont.							0.0440	0.1284
Que.								0.2046

another (Appendix E3 and Table 9). No evidence of such annual persistence can be demonstrated. The one-year lagged autocorrelations shown in Table 9 are all insignificant and equally of positive and negative sign. In the absence of proven periodicities in the weather, one would not expect to find high correlations in the data of burned area at lags greater than one year. It is therefore disconcerting to find autocorrelation coefficients at three years and even at six years that are significant at the 95% level of confidence. With 56 correlations, however, one would expect 2.8 chance occurrences of such high values. The observation of 4 such values (positive correlations for Saskatchewan and Manitoba at three years' lag and negative correlations for British Columbia and Alberta at six years' lag) is consistent with the frequency expected by chance. There seems to be no other explanation.

Table 9. The mean, variance, and autocorrelation coefficients of the logarithm of relative area burned at lags of 1-6 years

	Mean	Variance	Lags (Years) 1	2	3	4	5	6
B.C.	-1.0145	2.2091	0.0477	0.2957	-0.1929	-0.1022	-0.2424	-0.4191
Y./N.W.T.	-0.7218	1.9681	0.1107	0.1495	0.2886	0.2248	0.0255	-0.0434
Alta.	-0.9494	1.9860	0.0868	0.1761	0.1715	-0.2874	-0.0971	-0.4527
Sask.	-1.0152	2.7073	0.0914	-0.0823	0.4983	-0.0082	-0.1129	0.1031
Man.	-1.0911	2.5828	-0.0541	-0.0868	0.3983	-0.2179	-0.0786	0.1938
W. Ont.	-2.3314	6.0258	-0.0690	0.0186	0.3124	-0.0373	-0.0092	0.1280
E. Ont.	-0.9438	1.9830	0.0819	-0.0976	0.0427	0.0037	0.1765	0.1035
Que.	-0.8333	2.1093	0.0142	-0.0964	-0.0612	-0.1023	-0.0458	-0.0529
Atl. Prov.	-1.2335	2.3925	0.0506	-0.0519	0.1876	-0.1526	-0.1821	-0.1176

Simultaneous provincial occurrences of severe fire

It is interesting to see to what extent severe fire occurs in more than one provincial area in a given month. One can see from Table 10 and Appendix F that of 140 months in a 28-year period there were only 19 in which two or more provinces simultaneously experienced an extreme fire month. In only 6 months in 28 years were more than two provincial areas affected simultaneously.

Saskatchewan, Manitoba, Western Ontario (West of Lake Nipigon), Eastern Ontario, Quebec, and the Atlantic Provinces.

The fire statistics are dominated by data from the Territories, where 37 percent of the total area burned is located. To obtain a reasonable appraisal of the severity of a fire season across Canada it was necessary to develop relative data for each province by dividing the monthly figures for burns in each province by the average monthly burn in that province over the period of record.

Table 10. Number of provinces experiencing extreme fire months simultaneously

Number of Provincial Areas	May	June	July	Aug.	Sept.	Total
0	20	15	18	23	28	104
1	4	4	5	4	0	17
2	3	6	3	1	0	13
3	0	0	2	0	0	2
4	1	2	0	0	0	3
5	0	1	0	0	0	1
6	0	0	0	0	0	0

Summary

An analysis of area burned by wildfire in Canada during the years 1953 to 1980 inclusive was carried out for the months of May through September in each of nine 'provinces'—British Columbia, the Yukon and the Northwest Territories, Alberta,

The monthly data of area burned for the provinces of Canada follow a log-normal distribution. From this it follows that for the great majority of months during the fire season, the burns are less than the average, whereas for a few, they are much greater than the average. Across Canada, 89 percent of the relative

burn occurs in 17 percent of the months that have above-average burns, and 60 percent of the burn occurs in the 5 percent of the months that have burns five or more times the average.

The peak of the fire season varies from one province to another, depending on the local climate. The peak occurs in May in Alberta and August in British Columbia, but on the average across Canada, the most severe fire months are June and July.

An increasing trend in area burned toward the late 1970s or early 1980s is seen to be a consequence of severe fire years in western Canada, particularly in the Territories but excluding British Columbia. In other parts of Canada, losses from fire have been decreasing during this period.

Persistence from month to month is the general rule across Canada, a bad fire month being followed by a second and sometimes a third bad fire month. The converse, that months having a low frequency of fire tend to persist, is also true. The greatest persistence occurs in British Columbia and the least in Alberta. The area burned in September does not seem to be correlated with that of any other month.

Except in the month of September, correlation between areas burned in adjacent provinces is generally high, although many exceptions occur. Burned area in the Territories in particular is generally poorly correlated with that in other provinces. Although not statistically significant, there appears to be a generally negative correlation between area burned in the far west and that in the east, suggesting a wavelength of high-pressure ridges and low-pressure troughs that is approximately a continent wide. The data of area burned in Western and Eastern Ontario are so highly correlated that it is seen to have been a mistake to separate them.

Persistence in the severity of fire from year to year cannot be demonstrated. The few high correlations that do occur are no more frequent than could happen by random chance.

The simultaneous occurrence of severe fire years in more than two provincial areas occurred in only 6 months in 28 years, or 4 percent of the time.

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APPENDIX A

Table A
Average Provincial Area Burned Monthly

	Hectares	Relative Data
1953	31 886	0.9014
1954	12 442	0.2851
1955	14 218	0.9262
1956	19 399	1.0551
1957	7 176	0.2515
1958	43 898	1.5451
1959	6 084	0.2770
1960	13 733	0.5848
1961	82 366	3.9132
1962	7 683	0.4178
1963	3 699	0.1930
1964	26 218	1.0186
1965	4 370	0.2394
1966	10 189	0.2089
1967	19 767	1.0742
1968	19 426	0.9158
1969	20 835	0.4724
1970	21 725	0.7310
1971	33 789	1.1994
1972	17 239	0.6463
1973	29 684	0.6885
1974	20 824	1.3738
1975	22 974	0.7273
1976	48 909	2.6642
1977	28 884	1.3156
1978	6 177	0.2039
1979	58 429	1.2584
1980	83 038	2.9123

APPENDIX B

Table B1
Area Burned, British Columbia

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	8 501	0.3999	168	0.0079	4 786	0.2251	1 846	0.0868	136	0.0064
1954	2 087	0.0981	1 087	0.0511	561	0.0264	215	0.0101	11	0.0005
1955	4 801	0.2258	9 147	0.4302	1 035	0.0487	1 478	0.0695	2 241	0.1054
1956	214 618	10.0946	412	0.0194	6 000	0.2822	3 700	0.1740	1 183	0.0557
1957	1 214	0.0571	4 047	0.1903	1 214	0.0571	14 558	0.6847	607	0.0286
1958	20 235	0.9517	80 939	3.8070	305 860	14.3862	371 275	17.4630	52 701	2.4788
1959	13 355	0.6281	17 564	0.8261	20 235	0.9517	48 308	2.2722	10 466	0.4923
1960	1 367	0.0643	960	0.0452	57 467	2.7029	44 132	2.0758	7 839	0.3687
1961	23 958	1.1269	28 329	1.3324	2 196	0.1033	420 882	19.7962	2 023	0.0952
1962	2 801	0.1318	9 512	0.4474	3 879	0.1824	1 856	0.0873	109	0.0051
1963	298	0.0140	2 962	0.1393	7 984	0.3755	5 514	0.2593	1 740	0.0818
1964	880	0.0414	445	0.0209	235	0.0110	77	0.0036	28	0.0013
1965	9 571	0.4502	6 055	0.2848	59 834	2.8143	28 490	1.3401	14 909	0.7012
1966	3 561	0.1675	12 586	0.5920	2 509	0.1180	1 012	0.0476	971	0.0457
1967	1 973	0.0928	12 560	0.5907	2 550	0.1199	43 000	2.0225	38 584	1.8148
1968	5 107	0.2402	364	0.0171	6 224	0.2928	1 012	0.0476	81	0.0038
1969	11 244	0.5289	119 917	5.6403	15 438	0.7261	11 938	0.5615	5 726	0.2693
1970	5 722	0.2692	45 414	2.1361	27 841	1.3095	10 765	0.5063	14 933	0.7024
1971	47 605	2.2391	27 660	1.3010	183 923	8.6508	91 437	4.3007	255	0.0120
1972	4 474	0.2104	12 075	0.5680	2 450	0.1152	1 251	0.0588	3 647	0.1715
1973	3 472	0.1633	1 049	0.0493	3 214	0.1512	12 856	0.6047	11 805	0.5553
1974	147	0.0069	5 375	0.2528	191	0.0090	1 749	0.0823	6 714	0.3158
1975	4 413	0.2076	2 240	0.1053	9 655	0.4541	266	0.0125	5 264	0.2476
1976	25 735	1.2104	10 305	0.4847	113	0.0053	10	0.0005	127	0.0060
1977	424	0.0199	234	0.0110	605	0.0285	532	0.0250	64	0.0030
1978	1 597	0.0751	11 903	0.5599	32 062	1.5081	3 107	0.1461	9	0.0004
1979	6 372	0.2997	2 143	0.1008	4 521	0.2126	6 206	0.2919	3 549	0.1669
1980	47 258	2.2228	917	0.0431	777	0.0365	118	0.0056	669	0.0315

Table B2
Area Burned, Yukon and Northwest Territories

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	1 567	0.0185	58 065	0.6849	531 413	6.2678	309 242	3.6474	0	0.0000
1954	11	0.0001	20 005	0.2360	82 172	0.9692	355 348	4.1912	411	0.0048
1955	35	0.0004	14 355	0.1693	61 558	0.7261	16 466	0.1942	1 950	0.0230
1956	1 049	0.0124	7 291	0.0860	19 922	0.2350	9 138	0.1078	1	0.0000
1957	15	0.0002	5 260	0.0620	22 368	0.2638	150 592	1.7762	4 115	0.0485
1958	9 598	0.1132	125 293	1.4778	479 520	5.6558	48 983	0.5777	0	0.0000
1959	190	0.0022	31 584	0.3725	30 136	0.3554	25	0.0003	0	0.0000
1960	6 618	0.0781	40 223	0.4744	2 039	0.0241	801	0.0095	2	0.0000
1961	5 272	0.0622	37 369	0.4408	291 699	3.4405	11 062	0.1305	8	0.0001
1962	72	0.0008	1 752	0.0207	16 335	0.1927	512	0.0060	18	0.0002
1963	25	0.0003	4 860	0.0573	6 565	0.0774	988	0.0117	341	0.0040
1964	8	0.0001	34 970	0.4125	127 238	1.5007	28 380	0.3347	0	0.0000
1965	213	0.0025	1 467	0.0173	3 672	0.0433	5 457	C 0644	473	0.0056
1966	83	0.0010	218 281	2.5746	150 215	1.7717	9 299	0.1097	101	0.0012
1967	25	0.0003	108 949	1.2850	23 422	0.2763	2 707	0.0319	607	0.0072
1968	133	0.0016	16 390	0.1933	9 428	0.1112	210 947	2.4880	1	0.0000
1969	20 941	0.2470	569 087	6.7122	35 726	0.4214	15 828	0.1867	3 440	0.0406
1970	80 964	0.9549	5 276	0.0622	100 591	1.1864	1 650	0.0195	18	0.0002
1971	529	0.0062	171 428	2.0219	396 872	4.6810	116 271	1.3714	20 316	0.2396
1972	71	0.0008	74 066	0.8736	212 719	2.5089	4 259	0.0502	15	0.0002
1973	128	0.0015	432 837	5.1052	311 715	3.6766	99 722	1.1762	12 808	0.1511
1974	26	0.0003	8 071	0.0952	28 193	0.3325	2 376	0.0280	1	0.0000
1975	456	0.0054	254 610	3.0030	383 323	4.5212	30 638	0.3614	7	0.0001
1976	25	0.0003	130 204	1.5367	464 421	5.4777	81 609	0.9626	18 925	0.2232
1977	1 112	0.0131	161 779	1.9081	201 254	2.3737	234 694	2.7681	12	0.0001
1978	98	0.0012	67 331	0.7941	14 712	0.1735	3 968	0.0468	232	0.0027
1979	10	0.0001	885 354	10.4425	974 188	11.4902	135 676	1.6003	1 252	0.0148
1980	56 619	0.6678	890 525	10.5034	335 617	3.9585	37 490	0.4422	984	0.0116

Table B3
Area Burned, Alberta

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	114 531	7.5324	1 387	0.0912	718	0.0472	144	0.0095	12 377	0.8140
1954	3 291	0.2165	8 811	0.5795	38 229	2.5143	129	0.0085	125	0.0083
1955	18 729	1.2318	20 615	1.3558	25 174	1.6557	7 727	0.5082	5 369	0.3531
1956	259 244	17.0498	1 571	0.1033	18 762	1.2340	6	0.0004	0	0.0000
1957	4 663	0.3067	672	0.0442	715	0.0471	0	0.0000	149	0.0098
1958	9 904	0.6514	285	0.0187	12 562	0.8262	67 529	4.4412	2 654	0.1745
1959	15 117	0.9942	462	0.0304	16 953	1.1149	396	0.0260	58	0.0038
1960	1 689	0.1111	718	0.0472	3 999	0.2630	110	0.0072	17	0.0011
1961	33 044	2.1732	29 879	1.9651	9 614	0.6323	3 179	0.2091	15	0.0010
1962	688	0.0452	1 008	0.0663	29	0.0019	18	0.0012	34	0.0022
1963	981	0.0645	846	0.0557	5 066	0.3331	106	0.0069	2	0.0001
1964	1 805	0.1187	3 084	0.2028	1 287	0.0847	21	0.0014	1	0.0001
1965	254	0.0167	299	0.0196	21 173	1.3925	21	0.0014	0	0.0000
1966	3 982	0.2619	23 614	1.5531	101	0.0067	5	0.0003	343	0.0225
1967	2 573	0.1692	921	0.0606	700	0.0460	1 556	0.1023	3 505	0.2305
1968	399 384	26.2664	138	0.0090	104	0.0068	5	0.0003	1	0.0001
1969	1 234	0.0812	23 436	1.5413	3 449	0.2268	798	0.0525	14	0.0009
1970	821	0.0540	30 127	1.9814	11 343	0.7460	2 730	0.1796	6 882	0.4526
1971	17 445	1.1473	765	0.0503	2 207	0.1451	42 093	2.7684	5	0.0003
1972	43 388	2.8535	5 196	0.3417	125	0.0083	229	0.0151	49	0.0032
1973	9 959	0.6550	76	0.0050	433	0.0285	74	0.0049	3	0.0002
1974	282	0.0185	14 331	0.9425	2 624	0.1725	796	0.0524	0	0.0000
1975	1 295	0.0851	348	0.0229	3 696	0.2431	74	0.0049	115	0.0075
1976	19 374	1.2742	138	0.0090	265	0.0175	31	0.0020	6	0.0004
1977	862	0.0567	8 212	0.5401	285	0.0187	4	0.0003	3	0.0002
1978	1 242	0.0817	3 553	0.2337	2 433	0.1600	112	0.0073	0	0.0000
1979	688	0.0452	187 280	12.3169	2 203	0.1449	4 123	0.2712	13	0.0008
1980	375 511	24.6964	65 851	4.3309	5 019	0.3301	87	0.0057	2	0.0002

Table B4
Area Burned, Saskatchewan

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	32 413	0.9863	26 587	0.8090	522	0.0159	554	0.0169	3	0.0001
1954	342	0.0104	87	0.0026	1 064	0.0324	7	0.0002	0	0.0000
1955	626	0.0190	2 505	0.0762	9 975	0.3035	232	0.0071	103	0.0031
1956	1 677	0.0510	18 301	0.5569	3 172	0.0965	543	0.0165	0	0.0000
1957	478	0.0146	12 225	0.3720	3 173	0.0966	196	0.0060	0	0.0000
1958	35 253	1.0727	323	0.0098	10 161	0.3092	956	0.0291	0	0.0000
1959	595	0.0181	423	0.0129	1 385	0.0421	31	0.0009	0	0.0000
1960	140	0.0043	46	0.0014	186 425	5.6726	253	0.0077	285	0.0087
1961	171 511	5.2188	454 235	13.8216	149 228	4.5407	13 027	0.3964	487	0.0148
1962	3 049	0.0928	564	0.0172	2 166	0.0659	194	0.0059	309	0.0094
1963	12 138	0.3694	30 716	0.9346	9 480	0.2884	4 452	0.1355	1	0.0000
1964	15 426	0.4694	258 164	7.8555	200 938	6.1142	7	0.0002	0	0.0000
1965	2 047	0.0623	178	0.0054	415	0.0126	1 300	0.0396	0	0.0000
1966	2 876	0.0875	9 837	0.2993	279	0.0085	29	0.0009	412	0.0125
1967	25 781	0.7845	5 626	0.1712	11 139	0.3389	82 716	2.5169	4 647	0.1414
1968	56 132	1.7080	1 129	0.0344	12 626	0.3842	788	0.0240	1	0.0000
1969	3 708	0.1128	1 425	0.0434	9 149	0.2784	47 669	1.4505	12	0.0004
1970	1 493	0.0454	499 014	15.1841	23 740	0.7224	7 481	0.2276	83	0.0025
1971	3 700	0.1126	77 900	2.3704	348	0.0106	3 964	0.1206	59	0.0018
1972	102 076	3.1060	92 469	2.8137	4 112	0.1251	7 475	0.2275	134	0.0041
1973	1 922	0.0585	152 701	4.6464	69 520	2.1154	14 466	0.4402	2	0.0000
1974	23	0.0007	25 852	0.7866	49	0.0015	20	0.0006	0	0.0000
1975	1 147	0.0349	10 425	0.3172	83 455	2.5394	12	0.0004	7	0.0002
1976	10 256	0.3121	4 603	0.1400	17 328	0.5273	58 248	1.7724	51	0.0015
1977	128 114	3.8983	106	0.0032	164	0.0050	7	0.0002	0	0.0000
1978	719	0.0219	79 031	2.4048	12 888	0.3922	15	0.0005	4	0.0001
1979	1 754	0.0534	75 729	2.3043	151 624	4.6137	112	0.0034	3	0.0001
1980	435 451	13.2500	352 792	10.7348	116 851	3.5556	11 608	0.3532	2 806	0.0854

Table B5
Area Burned, Manitoba

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	49 624	2.0050	413	0.0167	8 397	0.3393	17 264	0.6975	3	0.0001
1954	594	0.0240	404	0.0163	618	0.0250	333	0.0134	309	0.0125
1955	528	0.0213	1 236	0.0499	4 957	0.2003	14 434	0.5832	17 783	0.7185
1956	2 455	0.0992	92 966	3.7562	107 072	4.3262	618	0.0250	52	0.0021
1957	1 220	0.0493	33 257	1.3437	3 164	0.1278	186	0.0075	95	0.0038
1958	308 963	12.4834	9 681	0.3911	4 655	0.1881	1 086	0.0439	32	0.0013
1959	2 616	0.1057	78	0.0032	7 287	0.2944	476	0.0192	2	0.0001
1960	13 273	0.5363	656	0.0265	104 749	4.2323	27 371	1.1059	6 191	0.2502
1961	437 186	17.6641	271 158	10.9559	282 217	11.4027	92 491	3.7370	702	0.0284
1962	11 715	0.4733	35 195	1.4220	19 678	0.7951	3 322	0.1342	11	0.0005
1963	2 437	0.0985	1 287	0.0520	2 788	0.1126	7 825	0.3162	7	0.0003
1964	3 779	0.1527	272 963	11.0288	50 903	2.0567	244	0.0099	25	0.0010
1965	972	0.0393	150	0.0060	8	0.0003	470	0.0190	0	0.0000
1966	335	0.0135	484	0.0195	236	0.0095	970	0.0392	213	0.0086
1967	12 484	0.5044	7 159	0.2893	19 645	0.7937	58 196	2.3514	32 849	1.3273
1968	4 855	0.1962	1 343	0.0543	1 016	0.0411	19	0.0008	1	0.0000
1969	483	0.0195	2 876	0.1162	17 433	0.7044	3 377	0.1364	15	0.0006
1970	10 399	0.4201	19 167	0.7744	7 315	0.2956	43	0.0017	29	0.0012
1971	6 648	0.2686	1 530	0.0618	14	0.0006	82	0.0033	177	0.0071
1972	698	0.0282	5 143	0.2078	7 811	0.3156	4 233	0.1710	4	0.0002
1973	8 382	0.3387	6 225	0.2515	511	0.0206	6 900	0.2788	190	0.0077
1974	65	0.0026	11 101	0.4485	139 321	5.6292	10 122	0.4090	5	0.0002
1975	5 340	0.2158	9 996	0.4039	6 789	0.2743	72	0.0029	9	0.0004
1976	12 072	0.4878	23 600	0.9535	17 766	0.7178	15 531	0.6275	22 798	0.9211
1977	34 192	1.3815	48 921	1.9766	1 058	0.0427	31	0.0013	809	0.0327
1978	16 326	0.6596	1 179	0.0476	6 117	0.2471	28	0.0011	27	0.0011
1979	49	0.0020	27 899	1.1272	53 248	2.1515	726	0.0293	428	0.0173
1980	204 704	8.2709	127 138	5.1369	67 399	2.7232	7 970	0.3220	31	0.0013

Table B6
Area Burned, Ontario West of Lake Nipigon

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	7 055	0.4254	377	0.0227	129	0.0078	2 888	0.1742	51	0.0031
1954	1 177	0.0710	9 492	0.5724	180	0.0109	18	0.0011	4	0.0003
1955	19 341	1.1664	2 531	0.1527	56 904	3.4316	4 933	0.2975	530	0.0320
1956	339	0.0205	64 803	3.9080	146	0.0088	116	0.0070	9	0.0006
1957	1 626	0.0980	51	0.0031	130	0.0078	102	0.0062	3	0.0002
1958	4 317	0.2604	593	0.0358	15	0.0009	151	0.0091	3	0.0002
1959	62	0.0037	41	0.0025	120	0.0072	30	0.0018	0	0.0000
1960	720	0.0434	118	0.0071	8 386	0.5058	84	0.0051	41	0.0025
1961	1 288	0.0777	397 983	24.0006	6 120	0.3691	2 899	0.1748	17	0.0010
1962	84	0.0051	204	0.0123	132	0.0079	177	0.0107	10	0.0006
1963	2 004	0.1209	3 986	0.2404	1 049	0.0633	19	0.0011	16	0.0010
1964	1 887	0.1138	1 526	0.0920	1 635	0.0986	22	0.0013	4	0.0003
1965	224	0.0135	994	0.0599	174	0.0105	262	0.0158	0	0.0000
1966	36	0.0021	28	0.0017	17	0.0010	4	0.0002	1	0.0000
1967	494	0.0298	4 918	0.2966	58	0.0035	8	0.0005	46	0.0028
1968	225	0.0136	2	0.0001	12	0.0007	6	0.0004	0	0.0000
1969	1 210	0.0730	36	0.0021	15	0.0009	44	0.0026	19	0.0011
1970	361	0.0218	16 264	0.9808	45	0.0027	515	0.0310	15	0.0009
1971	4 605	0.2777	524	0.0316	308	0.0185	468	0.0282	4	0.0003
1972	13 603	0.8203	1 910	0.1152	191	0.0115	89	0.0053	4	0.0003
1973	259	0.0156	562	0.0339	210	0.0126	239	0.0144	6	0.0004
1974	454	0.0274	179 886	10.8481	256 895	15.4922	932	0.0562	13	0.0008
1975	259	0.0156	38	0.0023	209	0.0126	279	0.0168	21	0.0012
1976	82 045	4.9478	195 704	11.8021	36 442	2.1976	48 244	2.9094	328	0.0198
1977	160 513	9.6798	106 028	6.3941	19 917	1.2011	13	0.0008	2	0.0001
1978	231	0.0139	97	0.0059	40	0.0024	0	0.0000	2	0.0001
1979	205	0.0124	35 200	2.1228	13 430	0.8099	79	0.0048	44	0.0027
1980	310 860	18.7466	210 428	12.6900	4 955	0.2988	23	0.0014	2	0.0001

Table B7
Area Burned, Ontario East of Lake Nipigon

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	6 331	1.1288	339	0.0604	115	0.0206	2 592	0.4621	46	0.0082
1954	1 056	0.1883	8 519	1.5188	162	0.0289	17	0.0030	4	0.0007
1955	17 357	3.0945	2 272	0.4050	51 068	9.1046	4 427	0.7892	476	0.0848
1956	125	0.0224	23 945	4.2689	54	0.0096	42	0.0076	2	0.0004
1957	13 263	2.3646	412	0.0734	1 060	0.1890	837	0.1492	23	0.0040
1958	6 359	1.1337	874	0.1558	22	0.0039	222	0.0395	4	0.0008
1959	363	0.0648	239	0.0426	707	0.1261	178	0.0317	2	0.0003
1960	236	0.0421	39	0.0069	2 749	0.4900	28	0.0049	13	0.0024
1961	225	0.0401	69 348	12.3635	1 066	0.1900	505	0.0900	3	0.0005
1962	610	0.1088	1 486	0.2650	955	0.1703	1 287	0.2294	71	0.0127
1963	3 497	0.6234	6 953	1.2396	1 830	0.3262	32	0.0057	28	0.0050
1964	1 605	0.2862	1 299	0.2315	1 391	0.2481	19	0.0033	4	0.0007
1965	837	0.1491	3 706	0.6607	648	0.1154	979	0.1745	1	0.0001
1966	2 057	0.3668	1 621	0.2890	947	0.1689	218	0.0389	53	0.0095
1967	1 755	0.3129	17 480	3.1164	206	0.0368	28	0.0049	162	0.0289
1968	1 688	0.3009	16	0.0029	87	0.0154	44	0.0079	4	0.0007
1969	703	0.1253	21	0.0037	9	0.0016	25	0.0045	11	0.0019
1970	109	0.0195	4 907	0.8748	14	0.0025	155	0.0277	4	0.0008
1971	27 874	4.9694	3 170	0.5651	1 861	0.3318	2 832	0.5050	28	0.0049
1972	13 870	2.4728	1 947	0.3471	195	0.0348	90	0.0161	4	0.0008
1973	271	0.0483	588	0.1048	219	0.0390	251	0.0447	7	0.0012
1974	88	0.0157	34 809	6.2059	49 711	8.8626	180	0.0322	2	0.0004
1975	3 931	0.7008	569	0.1014	3 172	0.5655	4 231	0.7543	310	0.0552
1976	40 686	7.2535	97 048	17.3020	18 071	3.2218	23 924	4.2653	163	0.0290
1977	71 530	12.7525	47 249	8.4237	12 113	2.1595	6	0.0010	1	0.0001
1978	1 338	0.2385	562	0.1002	236	0.0420	2	0.0004	13	0.0023
1979	61	0.0109	10 470	1.8666	3 995	0.7122	23	0.0042	13	0.0023
1980	17 879	3.1876	12 103	2.1577	285	0.0508	1	0.0002	0	0.0000

Table B8
Area Burned, Quebec

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	27 786	1.5925	79 594	4.5616	10 267	0.5884	112 431	6.4436	996	0.0571
1954	1 810	0.1037	19 017	1.0899	46	0.0026	11	0.0006	4	0.0002
1955	4 393	0.2517	67 680	3.8788	147 063	8.4284	2 436	0.1396	223	0.0128
1956	1 927	0.1104	9 667	0.5540	55	0.0031	54	0.0031	14	0.0008
1957	22 382	1.2827	2 839	0.1627	170	0.0098	934	0.0535	13	0.0007
1958	1 233	0.0707	149	0.0085	185	0.0106	72	0.0041	6	0.0003
1959	6 812	0.3904	4 092	0.2345	25 500	1.4615	917	0.0526	699	0.0400
1960	26 957	1.5449	876	0.0502	1 515	0.0868	21 397	1.2263	166	0.0095
1961	2 152	0.1233	3 306	0.1895	18 626	1.0675	76	0.0044	8	0.0005
1962	6 815	0.3906	113 554	6.5080	77 736	4.4551	548	0.0314	501	0.0287
1963	12 968	0.7432	17 348	0.9942	3 655	0.2095	2	0.0001	16	0.0009
1964	11 052	0.6334	310	0.0178	7 828	0.4486	44	0.0025	497	0.0285
1965	2 659	0.1524	13 212	0.7572	1 275	0.0731	44	0.0025	16	0.0009
1966	455	0.0261	3 335	0.1912	3 623	0.2077	274	0.0157	42	0.0024
1967	1 385	0.0794	93 966	5.3853	13 136	0.7529	74	0.0042	253	0.0145
1968	48 773	2.7952	52 330	2.9991	28 966	1.6601	393	0.0225	70	0.0040
1969	537	0.0308	109	0.0062	556	0.0319	23	0.0013	14	0.0008
1970	601	0.0344	9 065	0.5195	19 361	1.1096	1 809	0.1037	2	0.0001
1971	24 782	1.4203	236 002	13.5256	763	0.0437	76	0.0043	36	0.0021
1972	23 223	1.3309	72 887	4.1772	9 118	0.5226	34	0.0019	73	0.0042
1973	1 209	0.0693	10 365	0.5940	43 424	2.4887	107 108	6.1385	2	0.0001
1974	265	0.0152	26 288	1.5066	69 197	3.9658	5 332	0.3056	72	0.0041
1975	437	0.0250	7 419	0.4252	16 013	0.9177	2 405	0.1378	1 037	0.0594
1976	1 709	0.0979	245 363	14.0621	248 908	14.2652	10 709	0.6138	6	0.0003
1977	19 481	1.1165	35 596	2.0401	292	0.0167	77	0.0044	132	0.0076
1978	1 944	0.1114	390	0.0223	2 996	0.1717	2 966	0.1700	601	0.0345
1979	1 546	0.0886	2 053	0.1177	3 133	0.1796	51	0.0029	0	0.0000
1980	17 502	1.0031	391	0.0224	2 049	0.1174	11 546	0.6617	1	0.0001

Table B9
Area Burned, Atlantic Provinces

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	1 515	0.1336	734	0.0647	596	0.0525	152	0.0134	192	0.0170
1954	840	0.0741	290	0.0256	36	0.0032	299	0.0264	635	0.0560
1955	8 003	0.7059	1 692	0.1492	4 796	0.4230	29	0.0025	578	0.0510
1956	697	0.0615	401	0.0354	780	0.0688	15	0.0013	17	0.0015
1957	4 010	0.3537	9 410	0.8300	506	0.0447	473	0.0418	483	0.0426
1958	1 333	0.1176	1 030	0.0909	355	0.0313	18	0.0016	16	0.0014
1959	2 271	0.2003	1 334	0.1177	12 115	1.0686	208	0.0184	366	0.0323
1960	6 025	0.5315	11 392	1.0048	4 974	0.4387	8 115	0.7158	16 783	1.4803
1961	1 781	0.1571	238 040	20.9959	22 468	1.9818	169 790	14.9761	19	0.0016
1962	19 005	1.6763	7 612	0.6714	--	0.0051	28	0.0025	25	0.0022
1963	1 978	0.1744	1 609	0.1419	46	0.0040	16	0.0014	1	0.0001
1964	5 128	0.4523	486	0.0429	144 114	12.7114	9	0.0008	23	0.0021
1965	3 640	0.3210	2 805	0.2474	3 682	0.3248	3 631	0.3202	417	0.0368
1966	1 239	0.1093	1 659	0.1464	363	0.0321	130	0.0114	79	0.0069
1967	187	0.0165	250 862	22.1269	219	0.0193	364	0.0321	54	0.0048
1968	3 743	0.3302	3 391	0.2991	3 363	0.2966	3 727	0.3288	115	0.0101
1969	749	0.0661	1 086	0.0958	7 858	0.6931	81	0.0072	84	0.0074
1970	962	0.0848	832	0.0734	8 631	0.7613	115	0.0102	20	0.0018
1971	743	0.0656	1 699	0.1498	1 293	0.1140	36	0.0032	192	0.0170
1972	7 352	0.6484	23 926	2.1104	18 902	1.6672	179	0.0158	4	0.0003
1973	143	0.0126	2 796	0.2467	6 251	0.5513	869	0.0767	21	0.0018
1974	1 577	0.1391	4 555	0.4018	48 901	4.3133	415	0.0366	59	0.0052
1975	658	0.0580	2 270	0.2003	17 607	1.5530	158 258	13.9589	1 076	0.0949
1976	3 502	0.3089	70 574	6.2249	141 235	12.4574	2 682	0.2366	26	0.0023
1977	1 799	0.1587	10 111	0.0891	414	0.0366	113	0.0100	9	0.0008
1978	1 257	0.1109	157	0.0138	73	0.0064	2 476	0.2184	3 903	0.3443
1979	5 204	0.4590	5 722	0.5047	22 902	2.0200	35	0.0031	8	0.0007
1980	3 210	0.2831	1 186	0.1046	55	0.0048	17	0.0015	43	0.0038

APPENDIX C

Table C1
Burned Area Averaged Over the Five Months

	B.C.	Y./N.W.T.	Alta.	Sask.	Man.	W. Ont.	E. Ont.	Que.	Atl. Prov.
					(hectares)				
1953	3 088	180 057	25 831	12 016	15 140	2 100	1 885	46 215	638
1954	792	91 590	10 117	300	451	2 174	1 952	4 177	420
1955	3 741	18 873	15 523	2 688	7 787	16 848	15 120	44 359	3 019
1956	45 183	7 480	55 917	4 739	40 633	13 083	4 834	2 343	382
1957	4 328	36 470	1 240	3 215	7 584	382	3 119	5 268	2 977
1958	166 202	132 679	18 587	9 339	64 883	1 016	1 496	329	551
1959	21 986	12 387	6 597	487	2 092	51	298	7 604	3 259
1960	22 353	9 937	1 306	37 430	30 448	1 870	613	10 182	9 458
1961	95 478	69 082	15 146	157 698	216 751	81 661	14 229	4 834	86 420
1962	3 631	3 738	355	1 256	13 984	121	882	39 831	5 346
1963	3 700	2 556	1 400	11 357	2 869	1 415	2 468	6 798	730
1964	333	38 119	1 239	94 907	65 583	1 015	864	3 946	29 952
1965	23 772	2 256	4 349	788	320	331	1 234	3 441	2 835
1966	4 128	75 596	5 609	2 686	447	17	979	1 546	694
1967	19 733	27 142	1 851	25 982	26 067	1 105	3 926	21 763	50 337
1968	2 558	47 380	79 926	14 135	1 447	49	368	26 106	2 868
1969	32 853	129 004	5 786	12 392	4 837	265	154	248	1 972
1970	20 935	37 700	10 380	106 362	7 391	3 440	1 038	6 168	2 112
1971	70 176	141 083	12 503	17 194	1 690	1 182	7 153	52 332	793
1972	4 779	58 226	9 797	41 253	3 578	3 159	3 221	21 067	10 073
1973	6 479	171 442	2 109	47 722	4 442	255	267	32 421	2 016
1974	2 835	7 733	3 607	5 189	32 123	87 636	16 958	20 231	11 102
1975	4 367	133 807	1 106	19 009	4 441	161	2 442	5 462	35 974
1976	7 258	139 037	3 963	18 097	18 353	72 553	35 978	101 339	43 604
1977	372	119 770	1 873	25 678	17 002	57 294	26 180	11 116	669
1978	9 736	17 268	1 468	18 532	4 735	74	430	1 779	1 573
1979	4 558	399 296	38 861	45 844	16 470	9 792	2 912	1 357	6 774
1980	9 948	264 247	89 294	183 902	81 448	105 254	6 054	6 298	902

Table C2
Burned Area Averaged over the Five Months of Relative Data

	B.C.	Y./N.W.T.	Alta.	Sask.	Man.	W. Ont.	E. Ont.	Que.	Atl. Prov.
1953	0.1452	2.1237	1.6989	0.3656	0.6117	0.1266	0.3360	2.6486	0.0563
1954	0.0373	1.0803	0.6654	0.0091	0.0182	0.1311	0.3479	0.2394	0.0370
1955	0.1759	0.2226	1.0209	0.0818	0.3146	1.0160	2.6956	2.5423	0.2663
1956	2.1252	0.0882	3.6775	0.1442	1.6417	0.7890	0.8618	0.1343	0.0337
1957	0.2036	0.4302	0.0815	0.0978	0.3064	0.0231	0.5561	0.3019	0.2625
1958	7.8173	1.5649	1.2224	0.2842	2.6216	0.0613	0.2668	0.0188	0.0486
1959	1.0341	0.1461	0.4339	0.0148	0.0845	0.0031	0.0531	0.4358	0.2874
1960	1.0514	0.1172	0.0859	1.1389	1.2302	0.1128	0.1093	0.5836	0.8342
1961	4.4908	0.8148	0.9961	4.7985	8.7576	4.9246	2.5368	0.2770	7.6225
1962	0.1708	0.0441	0.0234	0.0382	0.5650	0.0073	0.1573	2.2828	0.4715
1963	0.1740	0.0301	0.0921	0.3456	0.1159	0.0853	0.4400	0.3896	0.0644
1964	0.0157	0.4496	0.0815	2.8879	2.6498	0.0612	0.1540	0.2262	2.6419
1965	1.1181	0.0266	0.2860	0.0240	0.0129	0.0199	0.2200	0.1972	0.2501
1966	0.1942	0.8916	0.3689	0.0817	0.0181	0.0010	0.1746	0.0886	0.0612
1967	0.9282	0.3201	0.1217	0.7906	1.0532	0.0666	0.7000	1.2473	4.4399
1968	0.1203	0.5588	5.2565	0.4301	0.0585	0.0030	0.0656	1.4962	0.2530
1969	1.5452	1.5216	0.3806	0.3771	0.1954	0.0160	0.0274	0.0142	0.1739
1970	0.9847	0.4447	0.6827	3.2364	0.2986	0.2075	0.1850	0.3535	0.1863
1971	3.3007	1.6640	0.8223	0.5232	0.0683	0.0713	1.2752	2.9992	0.0699
1972	0.2248	0.6868	0.6444	1.2553	0.1446	0.1905	0.5743	1.2074	0.8884
1973	0.3047	2.0221	0.1387	1.4521	0.1795	0.0154	0.0476	1.8581	0.1778
1974	0.1334	0.0912	0.2372	0.1579	1.2979	5.2850	3.0234	1.1595	0.9792
1975	0.2054	1.5782	0.0727	0.5784	0.1794	0.0097	0.4355	0.3130	3.1730
1976	0.3414	1.6399	0.2606	0.5507	0.7416	4.3753	6.4143	5.8079	3.8460
1977	0.0175	1.4126	0.1232	0.7813	0.6870	3.4552	4.6674	0.6370	0.0590
1978	0.4579	0.2037	0.0965	0.5639	0.1913	0.0045	0.0767	0.1020	0.1388
1979	0.2144	4.7096	2.5558	1.3950	0.6655	0.5905	0.5192	0.0777	0.5975
1980	0.4679	3.1167	5.8726	5.5958	3.2909	6.3474	1.0793	0.3609	0.0796

Table C3
Natural Logarithms of Averages over the Five Months
of Relative Area Burned

	B.C.	Y./N.W.T.	Alta.	Sask.	Man.	W. Ont.	E. Ont.	Que.	Atl. Prov.
1953	-1.9296	0.7532	0.5300	-1.0062	-0.4915	-2.0667	-1.0906	0.9740	-2.8771
1954	-3.2888	0.0772	-0.4074	-4.6995	-4.0063	-2.0318	-1.0558	-1.4296	-3.2968
1955	-1.7378	-1.5024	0.0207	-2.5035	-1.1565	0.0159	0.9916	0.9331	-1.3231
1956	0.7539	-2.4281	1.3022	-1.9366	0.4957	-0.2370	-0.1487	-2.0077	-3.3903
1957	-1.5916	-0.8435	-2.5072	-2.3248	-1.1829	-3.7679	-0.5868	-1.1977	-1.3375
1958	2.0563	0.4478	0.2008	-1.2581	0.9638	-2.7920	-1.3213	-3.9739	-3.0241
1959	0.0335	-1.9235	-0.8349	-4.2131	-2.4710	-5.7764	-2.9356	-0.8306	-1.2469
1960	0.0501	-2.1439	-2.4546	0.1301	0.2072	-2.1821	-2.2137	-0.5385	-0.1813
1961	1.5020	-0.2048	-0.0039	1.5683	2.1699	1.5942	0.9309	-1.2837	2.0311
1962	-1.7673	-3.1213	-3.7550	-3.2649	-0.5709	-4.9199	-1.8496	0.8254	-0.7518
1963	-1.7487	-3.5032	-2.3849	-1.0625	-2.1550	-2.4616	-0.8210	-0.9426	-2.7426
1964	-4.1541	-0.7994	-2.5072	1.0605	0.9745	-2.7936	-1.8708	-1.4863	0.9715
1965	0.1116	-3.6268	-1.2518	-3.7297	-4.3505	-3.9170	-1.5141	-1.6235	-1.3859
1966	-1.6389	-0.1147	-0.9972	-2.5047	-4.0118	-6.9078	-1.7453	-2.4236	-2.7936
1967	-0.0745	-1.1391	-2.1062	-0.2350	0.0518	-2.7091	-0.3567	0.2210	1.4906
1968	-2.1178	-0.5820	1.6595	-0.8437	-2.8387	-5.8091	-2.7242	0.4029	-1.3744
1969	0.4352	0.4198	-0.9660	-0.9752	-1.6327	-4.1352	-3.5972	-4.2545	-1.7493
1970	-0.0154	-0.8104	-0.3817	1.1745	-1.2087	-1.5726	-1.6874	-1.0399	-1.6804
1971	1.1941	0.5092	-0.1956	-0.6478	-2.6838	-2.6409	0.2431	1.0983	-2.6607
1972	-1.4925	-0.3757	-0.4394	0.2274	-1.9338	-1.6581	-0.5546	0.1885	-0.1183
1973	-1.1884	0.7041	-1.9754	0.3730	-1.7176	-4.1734	-3.0449	0.6196	-1.7271
1974	-2.0144	-2.3947	-1.4389	-1.8458	0.2607	1.6649	1.1064	0.1480	-0.0210
1975	-1.5828	0.4563	-2.6214	-0.5475	-1.7181	-4.6356	-0.8313	-1.1616	1.1547
1976	-1.0747	0.4946	-1.3448	-0.5966	-0.2989	1.4760	1.8585	1.7592	1.3470
1977	-4.0456	0.3454	-2.0939	-0.2468	-0.3754	1.2399	1.5406	-0.4510	-2.8302
1978	-0.7811	-1.5911	-2.3382	-0.5729	-1.6539	-5.4037	-2.5679	-2.2828	-1.9747
1979	-1.5399	1.5496	0.9384	0.3329	-0.4072	-0.5268	-0.6555	-2.5549	-0.5150
1980	-0.7595	1.1368	1.7703	1.7220	1.1912	1.8480	0.0763	-1.0192	-2.5307

APPENDIX D

Table D
Burned Area Averaged Over the Nine Provinces

	May		June		July		Aug.		Sept.	
	hectares	relative	hectares	relative	hectares	relative	hectares	relative	hectares	relative
1953	27 703	1.5803	18 629	0.7021	61 883	0.8405	49 679	1.2835	1 534	0.1007
1954	1 245	0.0874	7 524	0.4547	13 674	0.4014	39 597	0.4727	167	0.0093
1955	8 201	0.7463	13 559	0.7408	40 281	2.7024	5 796	0.2879	3 250	0.1537
1956	53 570	3.0580	24 373	1.4765	17 329	0.6960	1 581	0.0381	142	0.0068
1957	5 430	0.5030	7 575	0.3424	3 611	0.0937	18 653	0.3028	610	0.0154
1958	44 133	1.8727	24 352	0.6662	90 371	2.3791	54 477	2.5121	6 157	0.2953
1959	4 598	0.2675	6 202	0.1825	12 715	0.6025	5 619	0.2692	1 288	0.0632
1960	6 336	0.3284	6 114	0.1849	41 367	1.6018	11 366	0.5731	3 482	0.2359
1961	75 157	2.9604	169 961	9.5628	87 026	2.6364	79 324	4.3905	365	0.0159
1962	4 982	0.3250	18 988	1.0478	13 441	0.6529	882	0.0565	121	0.0069
1963	4 036	0.2454	7 841	0.4283	4 274	0.1989	2 106	0.0820	239	0.0104
1964	4 619	0.2520	63 694	2.2116	59 508	2.5860	3 203	0.0398	65	0.0038
1965	2 269	0.1341	3 207	0.2287	10 098	0.5319	4 517	0.2197	1 757	0.0827
1966	1 625	0.1151	30 161	0.6296	17 588	0.2582	1 327	0.0293	246	0.0122
1967	5 184	0.2211	55 827	3.7025	7 897	0.2653	20 961	0.7852	8 967	0.3969
1968	57 782	3.5391	8 345	0.4010	6 869	0.3121	24 105	0.3245	31	0.0021
1969	4 534	0.1427	79 777	1.5735	9 959	0.3427	8 865	0.2670	1 037	0.0359
1970	11 270	0.2116	70 007	2.5096	22 098	0.6818	2 807	0.1230	2 443	0.1292
1971	14 881	1.1674	57 853	2.2308	65 288	1.5551	28 584	1.0117	2 341	0.0317
1972	23 195	1.2746	32 180	1.2839	28 403	0.5899	1 982	0.0624	437	0.0205
1973	2 861	0.1514	67 466	1.2263	48 389	1.0093	26 943	0.9754	2 760	0.0798
1974	325	0.0252	34 474	2.3876	66 120	4.3087	2 436	0.1114	763	0.0363
1975	1 993	0.1498	31 991	0.5091	58 213	1.2312	21 804	1.6944	872	0.0518
1976	21 712	1.7659	86 393	5.8349	104 950	4.3208	26 777	1.2656	4 714	0.1337
1977	46 447	3.2308	45 460	2.3762	26 234	0.6536	26 164	0.3123	115	0.0050
1978	2 750	0.1460	18 245	0.4647	7 951	0.3004	1 408	0.0656	532	0.0428
1979	1 765	0.1079	136 872	3.4337	136 583	2.4816	16 337	0.2457	590	0.0228
1980	163 222	8.0365	184 592	5.0804	59 223	1.2306	7 651	0.1993	504	0.0149

APPENDIX E

Table E1
Correlation between the Areas
Burned in Each Month and in Subsequent Months

		June	July	Aug.	Sept.
B.C.	May	-0.0344	0.0684	0.0452	-0.0821
	June		0.4798	0.4177	0.4332
	July			0.5854	0.6267
	Aug.				0.4872
Y./N.W.T.	May	0.2942	0.0028	-0.1776	-0.1085
	June		0.5959	0.0324	0.1447
	July			0.3043	0.3024
	Aug.				0.1161
Alta.	May	0.0603	-0.0288	-0.1065	0.0056
	June		-0.0542	-0.0581	-0.0501
	July			0.0894	0.0700
	Aug.				0.0875
Sask.	May	0.4943	0.2764	0.0322	0.4547
	June		0.4768	-0.0284	0.1497
	July			-0.0882	0.0865
	Aug.				0.6347
Man.	May	0.5439	0.6052	0.5934	-0.1029
	June		0.6615	0.4390	-0.1236
	July			0.7049	-0.0581
	Aug.				0.4478
W. Ont.	May	0.4352	0.0001	0.1686	0.0608
	June		0.3349	0.3505	0.0873
	July			0.1149	0.1937
	Aug.				0.5743
E. Ont.	May	0.4916	0.2315	0.4210	0.1303
	June		0.2886	0.6476	0.0403
	July			0.2778	0.5389
	Aug.				0.4077
Que.	May	0.1925	-0.1843	0.1471	0.0446
	June		0.5969	0.0364	-0.0163
	July			0.0435	-0.0295
	Aug.				0.2835
Atl. Prov.	May	-0.1241	0.0716	-0.1404	0.1181
	June		0.0855	0.4463	-0.0654
	July			0.0265	-0.0941
	Aug.				0.0011

Table E2
Correlation Coefficients between Areas Burned in Each Province, by Month

	Y./N.W.T.	Alta.	Sask.	Man.	W. Ont.	E. Ont.	Que.	Atl. Prov.
May								
B.C.	0.0415	0.4719	0.0994	0.0780	0.0987	-0.0165	-0.0894	-0.1683
Y./N.W.T.		0.2447	0.4383	0.2012	0.4240	-0.0455	-0.0771	-0.1284
Alta.			0.5762	0.1587	0.4715	-0.0155	0.5202	-0.0414
Sask.				0.5622	0.8626	0.2850	0.2343	-0.0101
Man.					0.2585	-0.0092	-0.0948	-0.1149
W. Ont.						0.5727	0.1648	-0.0094
E. Ont.							0.2364	-0.0225
Que.								0.1568
June								
B.C.	0.1662	-0.0132	0.0782	-0.0829	-0.0484	-0.0836	-0.0705	0.0343
Y./N.W.T.		0.7357	0.1805	0.0437	0.1393	-0.0505	-0.1508	-0.1033
Alta.			0.2487	0.1157	0.1882	0.0291	-0.2076	-0.0187
Sask.				0.6376	0.5008	0.1652	-0.2016	0.2634
Man.					0.5966	0.3461	-0.1950	0.3652
W. Ont.						0.8034	0.0627	0.5120
E. Ont.							0.3920	0.4981
Que.								0.1714
July								
B.C.	0.2307	0.0991	-0.1102	-0.1430	-0.1187	-0.1467	-0.1870	-0.1663
Y./N.W.T.		-0.2226	0.3146	0.0348	-0.0940	-0.0829	0.0779	0.1751
Alta.			-0.1744	0.0138	-0.0370	0.1431	-0.0094	-0.2044
Sask.				0.5153	-0.1112	-0.1444	-0.1391	0.3698
Man.					0.3288	0.1512	-0.0227	0.1549
W. Ont.						0.8184	0.3405	0.2401
E. Ont.							0.5957	0.2296
Que.								0.5434

	Y./N.W.T.	Alta.	Sask.	Man.	W. Ont.	E. Ont.	Que.	Atl. Prov.
Aug.								
B.C.	-0.1379	0.6166	0.0065	0.5745	-0.0461	-0.0878	-0.1090	0.4863
Y./N.W.T.		-0.0005	-0.1656	-0.1725	0.0319	0.0422	0.3627	-0.1399
Alta.			-0.0935	-0.0871	-0.0594	-0.0174	-0.1118	-0.0651
Sask.				0.4435	0.4662	0.4175	-0.0118	-0.0344
Man.					0.1088	0.0467	0.0554	0.5365
W. Ont.						0.9754	0.0368	-0.0114
E. Ont.							0.0468	0.0534
Que.								-0.0856
Sept.								
B.C.	-0.1214	0.1995	0.3822	0.3147	-0.0975	0.0032	-0.1062	-0.0139
Y./N.W.T.		-0.1467	-0.0954	0.2524	0.2833	0.0938	-0.2482	-0.1053
Alta.			0.0919	0.1947	0.2794	0.2637	0.3636	-0.0913
Sask.				0.6061	-0.0283	0.1299	-0.0480	-0.0366
Man.					0.6223	0.5761	-0.0404	0.0616
W. Ont.						0.7959	-0.0149	-0.0022
E. Ont.							0.3203	-0.0402
Que.								0.0737

Table E3
The Mean, Variance, and Autocorrelation Coefficients of the Relative Area Burned at Lags of 1-6 Years

	Mean	Variance	Lags (Years) 1	2	3	4	5	6
B.C.	1.0000	2.7619	-0.0622	0.1575	0.1961	-0.1708	-0.1646	-0.1561
Y./N.W.T.	1.0000	1.1230	0.2096	0.1146	0.1731	0.2985	0.0127	0.1187
Alta.	1.0000	2.2628	0.0793	-0.0358	-0.0084	-0.1407	-0.1342	-0.2070
Sask.	1.0000	1.9742	-0.0031	-0.1404	0.2092	-0.1912	-0.2528	-0.0356
Man.	1.0000	2.9661	-0.0380	-0.1388	0.4036	-0.1531	-0.0594	0.0474
W. Ont.	1.0000	3.4896	-0.0198	0.0468	0.2435	0.1263	-0.0980	0.3000
E. Ont.	1.0000	2.2707	0.2226	0.0554	0.0685	-0.0942	0.0326	0.0906
Que.	1.0000	1.6166	-0.1191	-0.0062	-0.0065	-0.1125	0.2481	-0.1406
Atl. Prov.	1.0000	3.0419	-0.0022	-0.2077	0.1375	-0.2285	-0.2432	0.2109

APPENDIX F

Table F
Provinces Having Areas Burned above the May-to-September Average by a Factor of 5 or More

	May	June	July	Aug.	Sept.
1953	Alta.		Y./N.W.T.	Que.	-
1954					-
1955			E. Ont.,Que.		-
1956	Alta.,B.C.				-
1957					-
1958	Man.		B.C.,Y./N.W.T.	B.C.	-
1959					-
1960			Sask.		-
1961	Sask.,Man.	Sask.,Man.,W. Ont., E. Ont., Atl. Prov.	Man.	B.C., Atl. Prov.	-
1962		Que.			-
1963					-
1964		Sask.,Man.	Sask.,Atl. Prov.		-
1965					-
1966					-
1967		Que.,Atl. Prov.			-
1968	Alta.				-
1969		B.C.,Y./N.W.T.			-
1970		Sask.			-
1971		Que.	B.C.		-
1972					-
1973		Y./N.W.T.		Que.	-
1974		W. Ont.,E. Ont.	Man.,W. Ont., E. Ont.		-
1975				Atl. Prov.	-
1976	E. Ont.	W. Ont.,E. Ont., Que.,Atl. Prov.	Y./N.W.T.,Que., Atl. Prov.		-
1977	W. Ont.,E. Ont.	W. Ont.,E. Ont.			-
1978					-
1979		Y./N.W.T.,Alta.	Y./N.W.T.		-
1980	Alta.,Sask. Man.,W. Ont.	Y./N.W.T.,Sask., Man.,W. Ont.			-